

Mixed convection boundary layer flow embedded in a thermally stratified porous medium saturated by a nanofluid

ABSTRACT

We present the numerical investigation of the steady mixed convection boundary layer flow over a vertical surface embedded in a thermally stratified porous medium saturated by a nanofluid. The governing partial differential equations are reduced to the ordinary differential equations, using the similarity transformations. The similarity equations are solved numerically for three types of metallic or nonmetallic nanoparticles, namely, copper (Cu), alumina (Al₂O₃), and titania (TiO₂), in a water-based fluid to investigate the effect of the solid volume fraction or nanoparticle volume fraction parameter ϕ of the nanofluid on the flow and heat transfer characteristics. The skin friction coefficient and the velocity and temperature profiles are presented and discussed.

Keyword: Boundary layer; Mixed convection; Nanofluid.